

CITY OF IONA (PWS 7100041)
SOURCE WATER ASSESSMENT FINAL REPORT

October 11, 2001



State of Idaho
Department of Environmental Quality

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Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the Act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for City of Iona, Idaho*, describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The City of Iona drinking water system consists of three well sources. Well #1 and the backup Well #2 have moderate susceptibility ratings to inorganic, volatile organic, synthetic organic, and microbial contamination. Well #3, the other backup source, has a high rating for all types of contamination. Though Well #1 has numerous potential contaminant sources, it has moderate ratings for hydrologic sensitivity and system construction. Well #2 has low to moderate ratings for land use because of a lack of potential contaminant sources. Well #3 has numerous potential contaminant sources, but no well log was available, so the hydrologic sensitivity and system construction scores were high as well.

None of the wells has recorded the presence of synthetic organic or volatile organic contamination during any water chemistry tests. The inorganic contaminants fluoride and barium have been detected, but at levels well below the Maximum Contaminant Level. Nitrate concentrations have been consistently below 3.2 mg/l. Total coliform bacteria and *E-coli* bacteria were detected in the distribution system in October 1994. Despite the lack of contamination in the well water, the City of Iona should be aware that the potential for contamination still exists. Surrounding agricultural land use practices have contributed to the ratings of “High” for County Level Nitrogen Fertilizer Use, County Level Herbicide Use, and Total County Level Ag-Chemical Use. The delineations also fall within a synthetic organic priority area for the pesticide Atrazine.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

For City of Iona, source water protection activities should first focus on correcting any deficiencies outlined in the Sanitary Survey. Additionally, there should be a focus on implementation of practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas. Much of the designated protection areas are outside the direct jurisdiction of City of Iona, making collaboration and partnerships with state and local agencies and industry groups critical to the success of source water protection. All wells should maintain sanitary survey standards regarding wellhead protection. Should microbial contamination become a problem, appropriate disinfection practices would need to be implemented.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation contains some urban and residential land uses. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. Environmental Protection Agency. As there are transportation corridors through the delineation, the Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water assessment protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Idaho Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR CITY OF IONA, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings used to develop the assessment also is attached.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The public drinking water system for the City of Iona is comprised of three ground water wells that serve approximately 1200 people through approximately 400 connections. The wells are located in Bonneville County, within the city limits (Wells #1 and #3) and 1 mile to the east of the city (Well #2) (Figure 1).

Though there are no significant water chemistry problems in the ground water, there have been detections in the tested well water of the inorganic contaminants (IOCs) fluoride, barium, and nitrate at levels below the current Maximum Contaminant Levels (MCLs). Total coliform bacteria and *E-coli* bacteria were detected in the distribution system in October 1994, but repeat samples have never found bacteria present at the wellheads. No volatile organic contaminants (VOCs) or synthetic organic contaminants (SOCs) have been detected in the well water. The delineations cross areas of concern for “County Level Nitrogen Fertilizer Use”, “Country Level Herbicide Use”, and “Total County Level Ag-Chemical Use”. Additionally, the delineations cross an SOC priority area for the pesticide Atrazine. Each of these land uses is rated as high for this area.

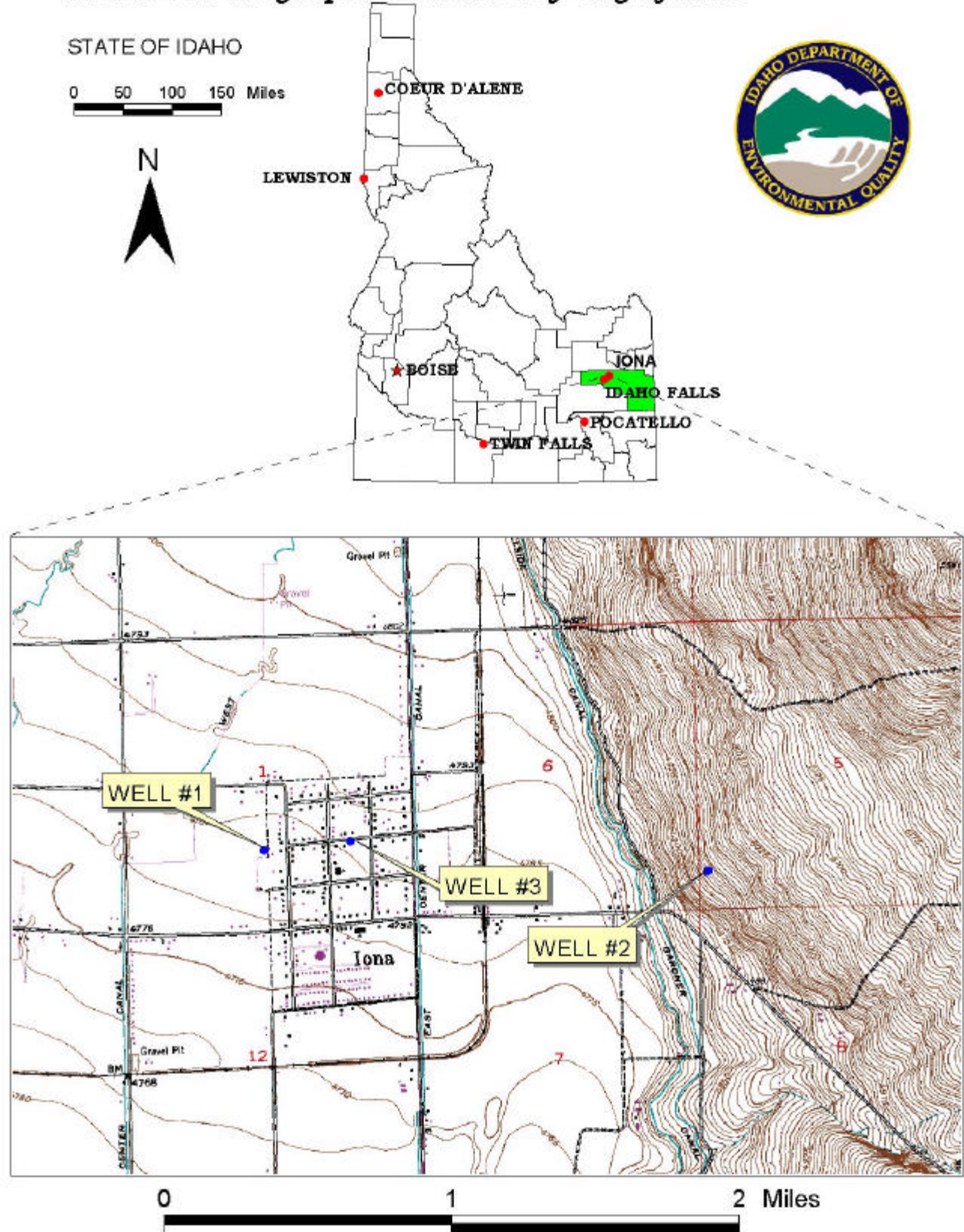
Defining the Zones of Contribution – Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ contracted with Washington Group, International (WGI) to perform the delineations using a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) TOT for water associated with the basalt of the Eastern Snake River Plain (ESRP) (Wells #1 and #3) and with the rhyolite of the Yellowstone Group of the ESRP (Well #2) in the vicinity of the City of Iona. The computer models used site specific data, assimilated by WGI from a variety of sources including the City of Iona well logs, other local area well logs, and hydrogeologic reports (detailed below).

Wells #1 and #3

The ESRP is a northeast trending basin located in southeastern Idaho. Ten thousand square miles of the basin are primarily filled with highly fractured layered Quaternary basalt flows of the Snake River Group, which are intercalated with terrestrial and lacustrine (lake deposited) sediments along the margins (Garabedian, 1992, p. 5). Individual basalt flows range from 10 to 50 feet in thickness and average 20 to 25 feet (Lindholm, 1996, p. 14). Basalt is thickest in the central part of the eastern plain and thins toward the margins. Whitehead (1992, p. 9) estimates the total thickness of the flows to be as great as 5,000 feet. A thin layer (0 to 100 feet) of windblown and fluvial sediments overlies the basalt.

FIGURE 1. Geographic Location of City of Iona



The layered basalts of the Snake River Group host one of the most productive aquifers in the United States. The aquifer is generally considered unconfined, yet it may be locally confined in some areas because of inter-bedded clay and dense unfractured basalt (Whitehead, 1992, p. 26). Whitehead (1992, p. 22) reports that well yields of 2,000 to 3,000 gal/min are common for wells open to less than 100 feet of the aquifer. Lindholm (1996, p. 18) estimates aquifer thickness to range from several hundred feet near the plain's margin to thousands of feet near the center.

The majority of aquifer recharge results from surface water irrigation activities (incidental recharge), which divert water from the Snake River and its tributaries (Ackerman, 1995, p. 4, and Garabedian, 1992, p. 11). Natural recharge occurs through stream losses, direct precipitation, and tributary basin underflow.

Regional ground water flow is to the southwest paralleling the basin (Cosgrove et al., 1999, p. 21; deSonneville, 1972, p. 78; Garabedian, 1992, p. 48; and Lindholm, 1996, p. 23). Ground water flow direction at the local scale is thought to be highly variable due to preferential flow paths through the fractured and layered basalts.

The delineated source water assessment areas for Wells #1 and #3 can best be described as corridors approximately 15 miles long and 1 mile wide extending to the northeast of the City of Iona and ending at the Snake River (Figures 2 and 3, Attachment A). The delineations only have the 3-year TOT because the Snake River is assessed to be the main source of the wells' water. The actual data used by WGI in determining the source water assessment delineation areas are available from DEQ upon request.

Well #2

The plain is bounded on the northeast by rocks of the Yellowstone Group (mainly rhyolite) and Idavada Volcanics to the southwest. The Snake River flows along part of the southern boundary and is the only drainage that leaves the plain. Rivers and streams entering the plain from the south are tributary to the Snake River. Rivers entering from the north vanish into the highly transmissive basalts of the Snake River Plain aquifer.

Little data are available on the extent and properties of the rhyolite formation on the basin's eastern margin. As such, model input is necessarily based on the regional pattern of ground water flow, interpretation of well logs, and professional judgment. Hydraulic conductivity estimates were derived from specific capacity data obtained from PWS well logs. The geometric mean was used to evaluate base case conditions. This value (66 ft/day) is approximately two orders of magnitude greater than the value used to represent rhyolite in the USGS three-dimensional model of the regional aquifer (Garabedian, 1992, p. 44). This value nonetheless is considered representative of rhyolite in the Idaho Falls area based on the findings of Haskett (1972). The approximate average saturated thickness of PWS wells (100 feet) was used to represent aquifer thickness. The effective porosity at the low end of the range for ESRP basalt, presented in Table F-3 of the Idaho Wellhead Protection Plan (0.11; DEQ, 1997, p. F-6), was used as an added factor of safety due to the lack of information about the rhyolite aquifer. Recharge was estimated at 2 inches/year (Garabedian, 1992, p. 20). The exact location of the rhyolite/bedrock contact is unknown to the east.

The delineated source water assessment area for the City of Iona Well #2 can best be described as a northeast trending corridor approximately 4 miles long and 2 miles wide (Figure 4, Attachment A). The actual data used by WGI in determining the source-water assessment delineation areas are available from DEQ upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of groundwater contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

Land use within the immediate area of the City of Iona wellheads consists of municipal and residential uses, while the surrounding area is predominantly irrigated agriculture.

It is important to understand that a release may never occur from a potential source of contamination provided they are using best management practices. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, including educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted in April 2001. The first phase involved identifying and documenting potential contaminant sources within the City of Iona Source Water Assessment Areas (Figures 2, 3, and 4) through the use of computer databases and Geographic Information System maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to identify and add any additional potential sources in the area.

The delineated source water areas contain differing numbers and potential sources of contamination. Wells #1 (Table 1, Figure 2) and #3 (Table 3, Figure 4) delineations have 18 and 17 potential contaminant sources, respectively. These include multiple underground storage tanks (USTs); dairies, contractors, a sand and gravel pit, unused recharge points, and a wastewater land application site. These delineations also have sites regulated by the National Pollutant Discharge Elimination System (NPDES) and the Superfund Amendments and Reauthorization Act (SARA). Additionally, the delineations cross Highway 26, the Union Pacific Railroad, Willow Creek, and the Snake River. The Well #2 (Table 2, Figure 3) delineation has a single UST and is crossed by the Union Pacific Railroad.

Section 3. Susceptibility Analyses

The water system's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment B contains the susceptibility analysis worksheets. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors: the surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. In this case, all of the wells have soils in the moderate- to well-drained class. In addition, all the wells have vadose zones made of either fractured basalt or gravel-sized particles which is conducive to increased rate of downward movement of contaminants. Similarly, fine-grained sediments in the subsurface and a water depth of more than 300 feet protect the ground water from contamination.

Hydrologic sensitivity is moderate for Well #1 (Table 4). The score was reduced because there is a low permeability interbed from 276 feet to 324 feet below ground surface (bgs) composed of brown clay and gravel.

Hydrologic sensitivity is high for Wells #2 and #3. The water table for Well #2 is less than 300 feet deep and there is not 50 feet of low permeability units. Well #3 does not have a well log so it was conservatively rated high.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capacity. Well logs were available for Wells #1 and #2 and the information about them is summarized below. If the wellhead and surface seal are maintained to standards, as outlined in Sanitary Surveys, then contamination down the well bore is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced. A Sanitary Survey was conducted for the wells in 1998.

Well #1 has a moderate system construction score. The well, drilled in 1993, has an annular seal to 40 feet below ground surface (bgs) into “gravel and clay” and casing to 327 feet bgs into “black scoria.” These materials are not assessed to be low in permeability. However, the production zone is greater than 100 feet below the static water table. The 1998 Sanitary Survey states that the wellhead and surface seal meet regulations and that the well is protected from surface flooding.

Well #2 has a moderate system construction score. The well, drilled in 1971, has an annular seal and casing to 265 feet bgs into “firm black basalt.” This material is assessed to be low permeability. However, the production zone is less than 100 feet below the static water table. The 1998 Sanitary Survey states that the well is protected from surface flooding. In addition, the 1998 Sanitary Survey required that the Well #2 casing vent be “uncapped, down turned 18” above the floor and screened.”

Well #3 has a high system construction score. As no well log exists, no determination could be made regarding the depth of the annular seal, casing, or production zone. The 1998 Sanitary Survey states that the well is protected from surface flooding. In addition, the 1998 Sanitary Survey indicates that the Well #3 sanitary seal does not meet specifications.

The available well logs allowed a determination as to whether current public water system (PWS) construction standards are being met. Though the wells may have been in compliance with standards when they were completed, current PWS well construction standards are more stringent. The Idaho Department of Water Resources *Well Construction Standards Rules* (1993) require all PWSs to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thickness for various diameter wells. Sixteen- to twenty-inch diameter wells require a casing thickness of at least 0.375-inches. The City of Iona wells have 0.250-inch thick casing. As such, the wells were assessed an additional point in the system construction rating.

Potential Contaminant Source and Land Use

Wells #1 and #3 rate high for IOCs (i.e. nitrates, arsenic), VOCs (i.e. petroleum products), and SOCs (i.e. pesticides) and moderate for microbial contaminants (i.e. bacteria). Commercial, municipal, and agricultural land uses in the delineated source areas account for the largest contribution of points to the potential contaminant inventory ratings. Well #2 rates low for IOCs, VOCs, and microbial contamination, and moderate for SOCs. A lack of potential sources in the 3-year TOT is the main reason for these lower scores. The wells are in a county with high levels of nitrogen fertilizer use, high herbicide use, and high total ag-chemical use. Additionally, the delineations cross an SOC priority area for the pesticide Atrazine.

Final Susceptibility Ranking

A detection above a drinking water standard MCL, any detection of a VOC or SOC, or a detection of total coliform bacteria or fecal coliform bacteria at the wellhead will automatically give a high susceptibility rating to a well despite the land use of the area because a pathway for contamination already exists. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0- to 3-year time of travel zone (Zone 1B) and agricultural land contribute greatly to the overall ranking. In terms of total susceptibility, Wells #1 and #2 rate moderate for all categories. Well #3 rates high for all categories.

Table 4. Summary of City of Iona Susceptibility Evaluation

Table 1: Summary of City of Iowa Susceptibility Evaluation										
Well	Susceptibility Scores ¹									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well #1	M	H	H	H	M	M	M	M	M	M
Well #2	H	L	L	M	L	M	M	M	M	M
Well #3	H	H	H	H	M	H	H	H	H	H

¹H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility,
IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

Wells #1 and #2 rate moderate for all categories. The differences in the ratings depend on the well log information obtained (moderate hydrologic sensitivity for Well #1) and the lack of potential contaminant sources (Well #2). With no well log information and numerous potential contaminant sources, Well #3 rated high for all categories.

Though there are no significant water chemistry problems in the ground water, there have been detections in the tested well water of the IOCs fluoride, barium, and nitrate at levels below the current MCLs. Total coliform bacteria and *E-coli* bacteria were detected in the distribution system in October 1994, but repeat samples have never found bacteria present at the wellheads. No VOCs or SOCs have been detected in the well water. The delineations cross areas of concern for “County Level Nitrogen Fertilizer Use”, “Country Level Herbicide Use”, and “Total County Level Ag-Chemical Use”. Each of these land uses is rated as high for this area. Additionally, the delineations cross an SOC priority area for the pesticide Atrazine.

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective source water protection program is tailored to the particular local source water protection area. A community with a fully developed source water protection program will incorporate many strategies. For City of Iona, source water protection activities should first focus on correcting any deficiencies outlined in the Sanitary Survey. If concentrations of nitrates detected in the source water continue to increase, the City of Iona should investigate various systems like ion exchange, reverse osmosis, or activated alumina that could be used to treat this chemical. Additionally, there should be a focus on the implementation of practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas and awareness of the potential contaminant sources in the area. Since much of the designated protection areas are outside the direct jurisdiction of

the City of Iona, collaboration and partnerships with state and local agencies, and industry groups should be established and are critical to the success of source water protection. All wells should adhere to sanitary survey standards regarding wellhead protection. Also, should microbial contamination become a problem, appropriate disinfection practices will need to be implemented. Continued vigilance in keeping the wells protected from surface flooding can also keep the potential for contamination reduced.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan as the delineation contains some urban and residential land uses. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the U.S. Environmental Protection Agency. As there are transportation corridors through the delineation, the Department of Transportation should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A community must incorporate a variety of strategies in order to develop a comprehensive drinking water assessment protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Idaho Falls Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Idaho Falls Regional DEQ Office (208) 528-2650

State DEQ Office (208) 373-0502

Website: <http://www2.state.id.us/deq>

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at 1-800-962-3257 for assistance with wellhead protection strategies.

POTENTIAL CONTAMINANT INVENTORY

LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as ASuperfund, is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100-year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

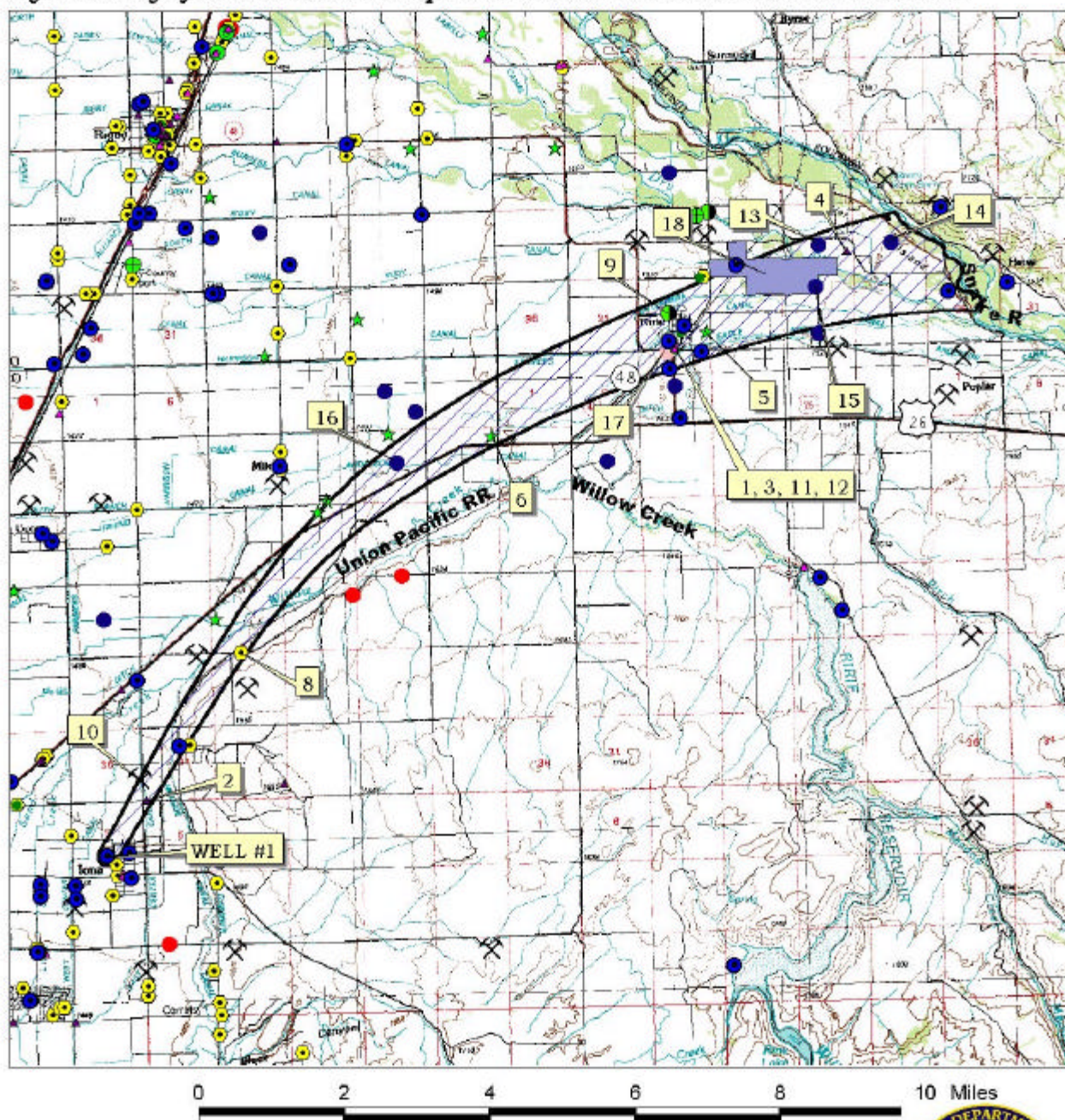
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Attachment A

Delineation Figures and Tables for the City of Iona

Figure 2. City of Iona Delineation Map and Potential Contaminant Source Locations



PWS# 7100041
WELL #1

Table 1. City of Iona Well #1, Potential Contaminant Inventory

SITE #	Source Description ¹	TOT Zone ² (years)	Source of Information	Potential Contaminants ³
1, 17	UST – open, AST	0-3	Database Search	VOC, SOC
2	UST – closed	0-3	Database Search	IOC, VOC, SOC
3, 11	UST – open, SARA	0-3	Database Search	VOC, SOC
4	UST – closed	0-3	Database Search	IOC, VOC, SOC
5	Dairy ≤ 200 cows	0-3	Database Search	IOC, SOC, Microbes
6	Dairy ≤ 200 cows	0-3	Database Search	IOC, SOC, Microbes
7	Dairy ≤ 200 cows	0-3	Database Search	IOC, SOC, Microbes
8	General Contractor	0-3	Database Search	IOC, VOC, SOC
9	NPDES	0-3	Database Search	IOC, Microbes
10	Sand and gravel pit	0-3	Database Search	IOC
12	SARA	0-3	Database Search	IOC, VOC
13	Recharge point - unused	0-3	Database Search	IOC, VOC, SOC
14	Recharge point - unused	0-3	Database Search	IOC, VOC, SOC
15	Recharge point - unused	0-3	Database Search	IOC, VOC, SOC
16	Recharge point - unused	0-3	Database Search	IOC, VOC, SOC
18	WLAP site	0-3	Database Search	IOC, VOC, SOC, Microbes
	Highway 26	0-3	GIS Map	IOC, VOC, SOC, Microbes
	Willow Creek	0-3	GIS Map	IOC, VOC, SOC, Microbes
	Union Pacific Railroad	0-3	GIS Map	IOC, VOC, SOC, Microbes
	Snake River	0-10	GIS Map	IOC, VOC, SOC, Microbes

¹ UST = underground storage tank, AST = above ground storage tank,

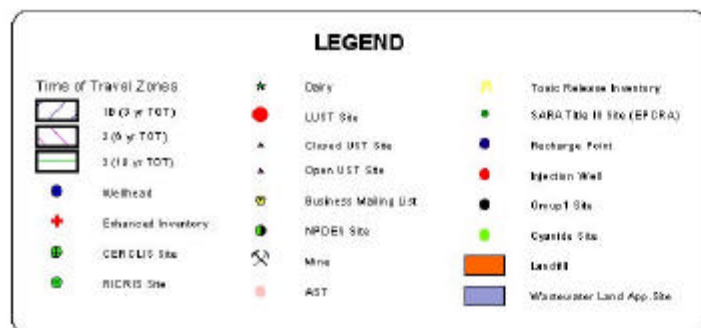
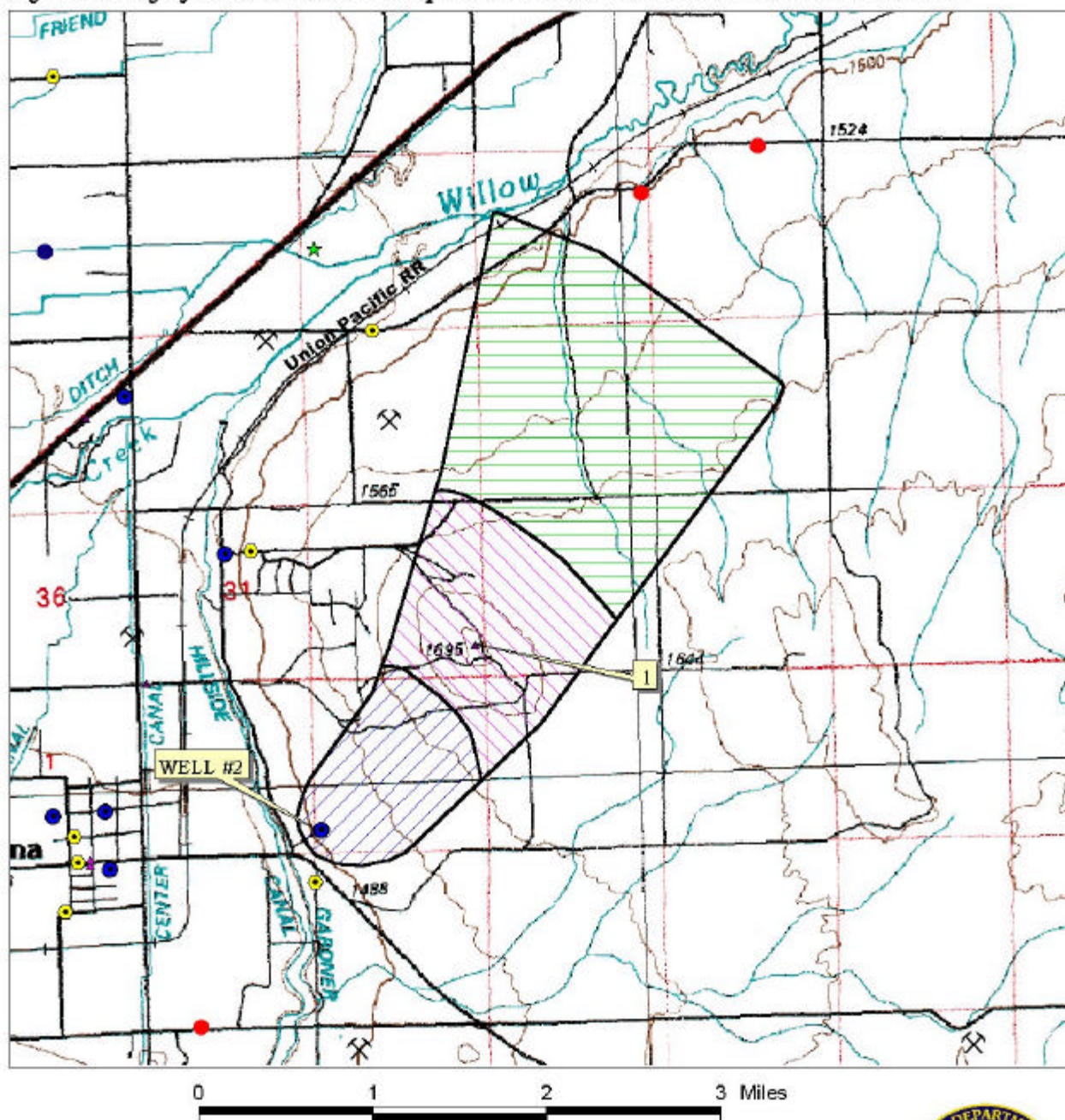
SARA = Superfund Amendments and Reauthorization Act,

NPDES = National Pollutant Discharge Elimination System, WLAP = wastewater land application site

² TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

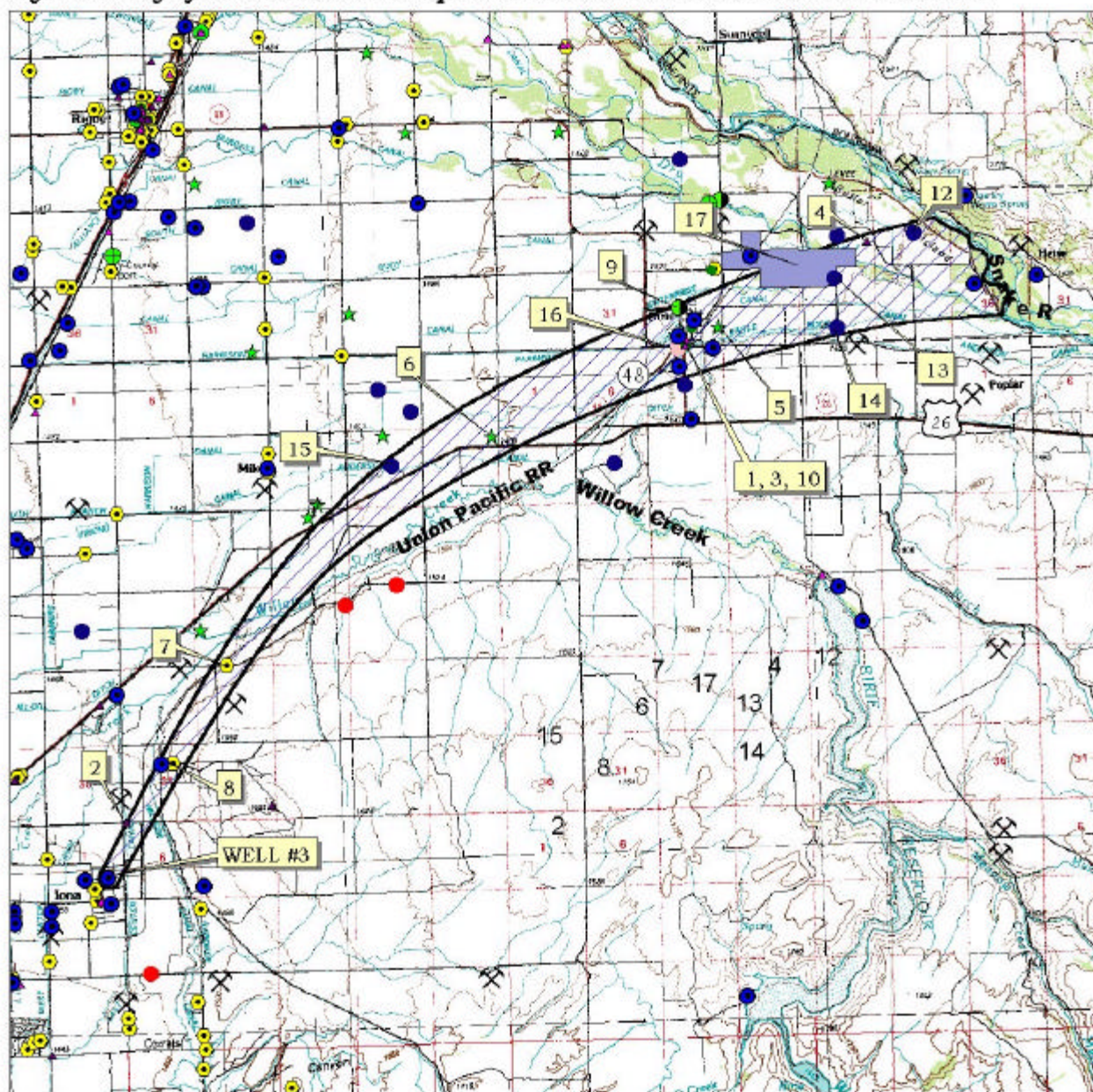
³ IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Figure 3. City of Iona Delineation Map and Potential Contaminant Source Locations



PWS# 7100041
WELL #2

Figure 4. City of Iona Delineation Map and Potential Contaminant Source Locations



PWS# 7100041
WELL #3

Table 2. City of Iona Well #2, Potential Contaminant Inventory

SITE #	Source Description ¹	TOT Zone ² (years)	Source of Information	Potential Contaminants ³
1	UST – closed	3-6	Database Search	VOC, SOC
	Union Pacific Railroad	6-10	GIS Map	IOC, VOC, SOC

¹ UST = underground storage tank

² TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

³ IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Table 3. City of Iona Well #3, Potential Contaminant Inventory

SITE #	Source Description ¹	TOT Zone ² (years)	Source of Information	Potential Contaminants ³
1, 16	UST – open, AST	0-3	Database Search	VOC, SOC
2	UST – closed	0-3	Database Search	IOC, VOC, SOC
3, 10	UST – open, SARA	0-3	Database Search	VOC, SOC
4	UST – closed	0-3	Database Search	IOC, VOC, SOC
5	Dairy ≤ 200 cows	0-3	Database Search	IOC, SOC, Microbes
6	Dairy ≤ 200 cows	0-3	Database Search	IOC, SOC, Microbes
7	General Contractor	0-3	Database Search	IOC, VOC, SOC
8	Steel Erectors	0-3	Database Search	VOC
9	NPDES	0-3	Database Search	IOC, Microbes
11	SARA	0-3	Database Search	IOC, VOC
12	Recharge point - unused	0-3	Database Search	IOC, VOC, SOC
13	Recharge point - unused	0-3	Database Search	IOC, VOC, SOC
14	Recharge point - unused	0-3	Database Search	IOC, VOC, SOC
15	Recharge point - unused	0-3	Database Search	IOC, VOC, SOC
17	WLAP site	0-3	Database Search	IOC, VOC, SOC, Microbes
	Highway 26	0-3	GIS Map	IOC, VOC, SOC, Microbes
	Willow Creek	0-3	GIS Map	IOC, VOC, SOC, Microbes
	Union Pacific Railroad	0-3	GIS Map	IOC, VOC, SOC, Microbes
	Snake River	0-10	GIS Map	IOC, VOC, SOC, Microbes

¹ UST = underground storage tank, AST = above ground storage tank,

SARA = Superfund Amendments and Reauthorization Act,

NPDES = National Pollutant Discharge Elimination System, WLAP = wastewater land application site

² TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

³ IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Attachment B

City of Iona
Susceptibility Analysis
Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

- 1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.273)
- 2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report

Public Water System Name :

IONA WATER DEPT

Well# : WELL #1

Public Water System Number 7100041

07/17/2001 11:29:39 AM

1. System Construction		SCORE			
Drill Date	07/25/1993				
Driller Log Available	YES				
Sanitary Survey (if yes, indicate date of last survey)	YES	1998			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	YES	0			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	YES	0			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		3			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	YES	0			
Total Hydrologic Score		4			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	17	14	16	8
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	8	8	7	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	YES	0	0	2	0
Land use Zone 1B Greater Than 50% Irrigated Agricultural Land		4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		16	16	18	12
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II		0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		25	23	27	14
4. Final Susceptibility Source Score		12	12	12	12
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

1. System Construction		SCORE			
	Drill Date	09/24/1971			
	Driller Log Available	YES			
	Sanitary Survey (if yes, indicate date of last survey)	YES	1998		
	Well meets IDWR construction standards	NO	1		
	Wellhead and surface seal maintained	NO	1		
	Casing and annular seal extend to low permeability unit	YES	0		
	Highest production 100 feet below static water level	NO	1		
	Well located outside the 100 year flood plain	YES	0		
Total System Construction Score			3		
2. Hydrologic Sensitivity					
	Soils are poorly to moderately drained	NO	2		
	Vadose zone composed of gravel, fractured rock or unknown	YES	1		
	Depth to first water > 300 feet	NO	1		
	Aquitard present with > 50 feet cumulative thickness	NO	2		
Total Hydrologic Score			6		
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
	Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2
	Farm chemical use high	YES	2	0	2
	IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2
Potential Contaminant / Land Use - ZONE 1B					
	Contaminant sources present (Number of Sources)	NO	0	0	0
	(Score = # Sources X 2) 8 Points Maximum		0	0	0
	Sources of Class II or III leacheable contaminants or	NO	0	0	0
	4 Points Maximum		0	0	0
	Zone 1B contains or intercepts a Group 1 Area	YES	0	0	2
	Land use Zone 1B	Less Than 25% Agricultural Land	0	0	0
Total Potential Contaminant Source / Land Use Score - Zone 1B		0	0	2	0
Potential Contaminant / Land Use - ZONE II					
	Contaminant Sources Present	YES	0	2	2
	Sources of Class II or III leacheable contaminants or	YES	1	1	0
	Land Use Zone II	Greater Than 50% Irrigated Agricultural Land	2	2	2
Potential Contaminant Source / Land Use Score - Zone II		3	5	4	0
Potential Contaminant / Land Use - ZONE III					
	Contaminant Source Present	YES	1	1	1
	Sources of Class II or III leacheable contaminants or	YES	1	1	1
	Is there irrigated agricultural lands that occupy > 50% of	YES	1	1	1
Total Potential Contaminant Source / Land Use Score - Zone III		3	3	3	0
Cumulative Potential Contaminant / Land Use Score		10	10	13	2
4. Final Susceptibility Source Score		11	11	12	10
5. Final Well Ranking		Moderate	Moderate	Moderate	Moderate

1. System Construction		SCORE			
Drill Date					
Driller Log Available	NO				
Sanitary Survey (if yes, indicate date of last survey)	YES	1998			
Well meets IDWR construction standards	NO	1			
Wellhead and surface seal maintained	NO	1			
Casing and annular seal extend to low permeability unit	NO	2			
Highest production 100 feet below static water level	NO	1			
Well located outside the 100 year flood plain	YES	0			
Total System Construction Score		5			
2. Hydrologic Sensitivity					
Soils are poorly to moderately drained	NO	2			
Vadose zone composed of gravel, fractured rock or unknown	YES	1			
Depth to first water > 300 feet	NO	1			
Aquitard present with > 50 feet cumulative thickness	NO	2			
Total Hydrologic Score		6			
3. Potential Contaminant / Land Use - ZONE 1A		IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A	IRRIGATED CROPLAND	2	2	2	2
Farm chemical use high	YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A	NO	NO	NO	NO	NO
Total Potential Contaminant Source/Land Use Score - Zone 1A		4	2	4	2
Potential Contaminant / Land Use - ZONE 1B					
Contaminant sources present (Number of Sources)	YES	14	16	15	7
(Score = # Sources X 2) 8 Points Maximum		8	8	8	8
Sources of Class II or III leacheable contaminants or	YES	7	8	6	
4 Points Maximum		4	4	4	
Zone 1B contains or intercepts a Group 1 Area	YES	0	0	2	0
Land use Zone 1B Greater Than 50% Irrigated Agricultural Land		4	4	4	4
Total Potential Contaminant Source / Land Use Score - Zone 1B		16	16	18	12
Potential Contaminant / Land Use - ZONE II					
Contaminant Sources Present	YES	2	2	2	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Land Use Zone II		0	0	0	
Potential Contaminant Source / Land Use Score - Zone II		3	3	3	0
Potential Contaminant / Land Use - ZONE III					
Contaminant Source Present	YES	1	1	1	
Sources of Class II or III leacheable contaminants or	YES	1	1	1	
Is there irrigated agricultural lands that occupy > 50% of	NO	0	0	0	
Total Potential Contaminant Source / Land Use Score - Zone III		2	2	2	0
Cumulative Potential Contaminant / Land Use Score		25	23	27	14
4. Final Susceptibility Source Score		16	16	16	16
5. Final Well Ranking		High	High	High	High